



and the reduction reaction in an alkali electrolyte solution is caused, while water will be decomposed. The hydrogen which hydrogen and  $H_2$  ion came to be generated on the surface of the hydrogen storing metal alloy, and was generated from said hydrogen storing metal alloy is diffused inside an alloy, by carrying out oxidation, makes a metal hydride generate and comes to perform a reduction reaction.

[0003] Furthermore, it comes to perform an electric discharge reaction by being contrary to this, and hydrogen in the metal hydride which causes catalytic reaction reacting with  $H_2$  ion on the surface of an alloy, and making water generate.

[0004] The structure of such a nickel metal hydride storage battery | The anode (1) of the shape of a sheet which contains a metal oxide or metal hydroxide as shown in drawing 1 | kind between the negative pole (2) of the shape of a sheet containing a hydrogen storing metal alloy, and said anode (1) and the negative pole (2), make SEPARATE (3) in which an insulation is made to be performed laminate, it is wound spirally, and an electrode group (4) is formed. This electrode group (4) is connecting the negative pole (2) to this case (5) and the negative pole lead (6) while being  $H_2$  ion in the case (5) of cathode terminal connection. [0005] Furthermore, the inside of said case (5) top is equipped with the seal object (8) which makes the anode can (8a) form in the bottom through annular packing (7). When the structure makes a battery runs rapidly in this seal object (8) the metal spring (9) raises a seal object and it is made to make internal gas exit into the atmosphere or exhausted electrically, and said seal object (8) and the anode (9) are electrically connected by the anode lead (10).

[0006]

[Problem to be solved by the invention] by the way  $H_2$  ion | the conventional nickel metal hydride storage battery constructed like | | metal | whether the flat and round which an anode and the negative pole are wound spirally make | on the edge by the side of the upper and lower plate of an anode and the negative pole | Or while the sheet occurred and use life of the storage battery was notably shortened by this by the cause of  $H_2$  ion which is the hydrogen storing metal alloy formed on the surface of the electrode in the manufacturing process at the time of advance of charge and discharge dropping out, there was a problem of capacity falling.

[0007] Moreover, in order to solve such | conventionally | a problem while making thickness form in a difference in the weight of SEPARATE wound between an anode and the negative pole, respectively and preventing degradation of the cycle length by a short circuit. The nickel metal hydride storage battery which enabled it to be satisfied of capacity is indicated by JP 43-76957A and the Tokin No. 76958 | three in | gazette.

[0008] By the way, the electrolyte solution distribution between anode | the supply of an electrolyte solution becomes difficult | and an electrode group is uneven, by the method in the present by generating of gas, a problem is in stability and the weight of SEPARATE especially | an embossment and pressing in | The defective battery, increased by decreasing of a

that end, and there was a problem that the work by which the weight of SEPARATE inserts an electrode group into a case after a size, and about [ that the capacity of a battery decreases as being thick ] and a manufacturing process was very difficult.

[0030] Then, are made in order that the invention may solve the above various problems, and [ the purpose of this invention ] between an anode and the negative pole -- storage -- a case -- while generating of the end by contact between the negative pole and an anode is prevented as an interval is held, and decreasing a defective reaction rate, it is in obtaining the nickel metal hydride storage battery which can extend the life of a storage battery further, and its production method.

[0031]

[Means for solving problem] [ the nickel metal hydride storage battery by this invention ] in order to attain the purpose like the above in the storage battery by which a case SEPARATE is inserted between the anode containing a metal oxide or metal hydride, the negative pole containing a hydrogen storing metal alloy, and said anode and the negative pole it is characterized by the thing is said space of the negative pole done for the separation formation of the replacing layer at the edge at least at any one electrode.

[0032] Furthermore, the production method of the nickel metal hydride storage battery by this invention ] in the method of [ ] the case object which fills up an inside with an electrolytic solution and has an anode cap to the up side after forming an electrode group after winding through SEPARATE between an anode and the negative pole, and inserting said electrode group into a case, and manufacturing a storage battery. After applying a synthetic layer to the edge of any one electrode of least among said anode and the negative pole, it is characterized by including the process in which make it dry and an insulating layer is made to form.

[0033]

[Mode for carrying out the invention] [One work example by this invention is hereafter explained in full detail over the accompanying drawings 2 and 4.

[0034] In a figure, the same name and the same mark are added together about the same composition as the conventional composition, and detailed explanation is omitted.

[0035] First, the insulation layer forming process which the invention applies the insulating layer [20] of synthetic resin material to the edge of any one electrode at least about the anode (1) of the shape of a sheet containing a metal oxide or metal hydride, and the negative pole (2) of the shape of a sheet containing a hydrogen storing metal alloy, and is dried and said anode (1). And the winding process which is made to insert SEPARATE (3) of an insulation material, winds spirally in the back, and forms an electrode group (4) between the negative poles (2). It consists of an insertion process to the case (5) of the cylindrical hermetic group (6) formed at the winding process, and a process where fill up the inside of said case (5) with electrolytic solution, such as PASEPARE, and make it a case object (5) to a top.

opening through parking (27).

[0315] Furthermore, in said insulation layer forming process, an etching is carried out, as shown in drawing 3 A, after the formation of the insulating layer (20) of predetermined thickness is carried out in the longitudinal direction of the edge of an anode (1) or the negative pole (2), for example, the right end of the anode wound through S&S AR(ITA) (2).

[0316] As said insulating layer (20) is not limited to the layer made to form in the start end of an anode (1) or the negative pole (2) in a longitudinal direction, for example, it is shown in drawing 4 B. As an insulating layer (20) can also be made to form in the edge by the side of one of protruding the up-and-down side edge part of said anode (1) or the negative pole (2), and it is shown in drawing 4 C. As an insulating layer (20) can also be made to form in the start end of an anode (1) or the negative pole (2), and an up-and-down side edge part and it is shown in drawing 4 D. The insulating layer (20) which has predetermined thickness and width can also be made to form on right and left of an anode (1) or the negative pole (2), and each up-and-down edge.

[0317] Moreover, being formed by A synthesis, resin is, desirable still more desirable, an-moulding resin, for example, phenol resin, an-epoxy resin, silicone resin, etc. are applied, adhesive lacquer and thermosetting, for example, polyethylene, polycarbonate, a D-oxa resin, etc. are applied, and it acts as said insulating layer (27).

[0318] Furthermore, after said insulating layer (20) made the edge of any one electrode in an anode (1) or the negative pole (2) wound into main of a spiral state, [can make it able to div. and can form, or can apply with the means of injection or a brush, and ] in O-100mm closing in, when outer-electrode letter-length-off the reaction voltage becomes poor and the operation work made to form so that it may have predetermined thickness, or being thicker than O-100mm becomes difficult, as for the thickness of an insulating layer (20), it is fairly desirable to be formed with the thickness of 0.05mm - about 0.3mm.

[0319] Moreover, as for the viscosity of the resin with which the application work of an insulating layer (20) becomes easy in said insulation layer forming process, it is 100 mPa·sec or more, and at least 1000 - 500,000 cP is best.

[0320]

[Working example]

(Work example 1) [ a nickel-plated compact / type / which make the fill up with a nickel oxide or nickel hydroxide in gas / sintering ] A sheet like anode (1) is manufactured by the F&SUTC formula when makes this metal a nickel oxide or a nickel hydroxide in a gas or porous metal in gas. After making the powder of a hydrogen storing metal alloy (nick by pressure by making porous metal, such as a metal network, a P-C&C, H&H&C) metal, and an excess formed metal, into gas. After releasing and the gas which makes powder of a hydrogen storing metal alloy the shape of a F&SUTC type in the sintering type is, under, and release of

and porous metal and drying it, the negative pole (2) is manufactured by the FEELT<sup>TM</sup> type which sticks by pressure by a plate etc., and is formed in the shape of a sheet.

[0021] Furthermore, the negative pole (2) which opens the electrolyte into the insulation layer (20) form so that it may have the thickness of 0.1 mm in the start end and up-and-down one edge part of said negative pole (2), and have said insulating layer (20) formed. After working where SEPARATE (3) is formed and forming an electrode group (4) between the anodes (1) in which the insulating layer (20) is not formed. After making it work into a case (5), the electrolyte solution was made in charge, the seal object (6) which has an air-ride cap (8a) through packing (7) in the opening of said case (5) has been provided, and the storage battery was done.

[0022] Under the present circumstances, the defective fraction by the stop at the time of the early stages of the storage battery manufactured by the expansion or charge and discharge is shown in Table 1, and the degradation rate of the storage battery by the cycle characteristics at the time of charge and discharge was shown in Table 2.

[0023] Firstly an epoxy resin in a longitudinal direction, with the thickness of 0.1 mm, and an insulating layer (20) is formed in the edge of the start end of the anode (1) and the negative pole (2) which were manufactured by the same method as the above-structured work example 1. (Work example 2) Moreover, said anode (1) and the negative pole (2), it worked in the state where SEPARATE (3) was made in mind. The electrode group (4) was formed, and a reinforced part manufactured the storage battery by the same method as a work example 1.

[0024] Furthermore, the defective fraction by the stop at the time of the early stages of the storage battery manufactured by the expansion or charge and discharge is shown in Table 1, and the degradation rate of the storage battery by the cycle characteristics at the time of charge and discharge was shown in Table 2.

[0025] The upper and lower sides of the anode (1) manufactured by the same method as a work example 1, and the negative pole (2). (Comparative example 1) Without cutting in the state where it went around the edge on either side, and performing any processing. Said anode (1). And the electrode group (4) was formed through SEPARATE (3) between the negative poles (2), and a reinforced part shows the defective fraction by the stop at the time of the early stages of the storage battery manufactured by the same method as a work example 1, or charge and discharge in Table 1, and showed the degradation rate of the storage battery by the cycle characteristics at the time of charge and discharge in Table 2.

[0026] The anode (1) manufactured by the same method as a work example 1, and the negative pole (2) at the start end around which it is wound Auxiliary SEPARATE about 5mm in length. (Comparative example 2) And after making SEPARATE (3) being, it would and the electrode group (4) was formed, and a reinforced part given. Its defective fraction by the stop at the time of the early stages of the storage battery manufactured by the same method as a

with example 1, in charge and discharge in Table 1, and showed the degradation rate of the storage battery by the cycle characteristic at the time of charge and discharge in Table 2.  
[0027] The powder (2) manufactured by the same method as a work example 1, and after separation with which the quality of the material is different between the negative pole (2), (C) (comparative example 5) And SEFARAYA (2) was constituted from polyphenylene resin, the electrode paste (4) was formed, and a removed part (room) the defective parting by the start at the time of the work stage of the storage battery manufactured by the same method as a work example 1, in charge and discharge in Table 1, and showed the degradation rate of the storage battery by the cycle characteristic at the time of charge and discharge in Table 2.

[0028]

(Table 1)

「表1 充電・放電試験結果」

	充電率1	充電率2	放電率1	放電率2	放電率3
充電率・80	9	6	1.4	5	1.8
放電率・80	0	6	9.5	1.0	3.6

[0029]

(Table 2)

「表2 充電・放電試験結果」

	充電率1	充電率2	放電率1	放電率2	放電率3
充電率・80	9	8	9	5	6
放電率・80	8	6	1.2	1.0	1.2

[0030] However, by the storage battery of said comparative example 5, the output level occurred by the increase in the pressure by generating of gas from the storage battery from high at the time of charge and discharge.

[0031] Although illustration and explanation were given about the welding system the above metal hydride storage battery in which mentioned this example, it cannot be overemphasized that it does not limit to this, for example, can apply also to the storage battery of a metal-air-type metal hydride.

[0032]

[Effect of the Invention] As mentioned above, by making the welding type which can be determined in advance from the welding plan and of an electrode on the negative side, the end part of welding and an up-and-down edge according to the expansion of the protruding

generation of the shot by contact of the anode surrounding the stone added from the inside of a storage battery, and the regular polishing of the desecrated surface can be carried out (minimum). The life of a storage battery is further extended by this and the characteristics of charge and discharge improve by it.